
VIVISECTION: IS IT JUSTIFIABLE?

BY
CHAS. BELL TAYLOR, F.R.C.S. AND M.D. EDIN.

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FELLOW OF THE MEDICAL SOCIETY OF LONDON;
LATE PRESIDENT OF THE PARISIAN MEDICAL SOCIETY.

An Address delivered before the Medico-Chirurgical Society of Nottingham,
November 16th, 1892.

MR. PRESIDENT AND GENTLEMEN,

I have long thought that any advance we may hope to make in the direction of civilization, any step towards the amelioration of the evils of existing conditions, must be mainly by way of the recognition of rights,—not only the rights of men and women who may be less fortunately placed than ourselves, but also the rights of those poor relations of ours whom we call animals, and to whom we owe so much of our enjoyment of life, so much of our well-being, so much of our prosperity, and but for whose cheerful and willing aid the business of the world could not be carried on. I must insist that it is our duty to treat these humble fellow-creatures of ours with the utmost kindness, care, and consideration, and that such duty is no less sacred than that which binds us in any of our social relations. It is true that the exigencies of our nature compel us to kill animals for food, and also in self-defence; but we are bound to make such death as swift and painless as possible, and nothing—absolutely nothing, to my mind—can justify deliberate, prolonged, and cold-blooded torture of any of them.* I need not dwell upon this

* “The right to kill and the right to torture are essentially different, and the assertion that one right covers and includes the other, is simply childish. The whole agitation against vivisection rests on the position that between death, a quick and easy death, and the infliction of pain so severe and prolonged as to be fairly called torture, there is a great gulf fixed, and that the right to inflict the one by no means carries with it the right to inflict the other. The existence of this gulf is admitted by the common sense of mankind, and is shown, for instance, by the discontinuance of legal torture as compared with the persistence of capital punishment. Vivisectors have never ventured to meet their opponents fairly and squarely on this ground,—to lay down that the infliction of pain amounting to torture is unjustifiable, and to assert that they do not in fact inflict it. They do not do this because they know very well that to make such an assertion, and to base their cause upon it, would be to deliver themselves into the hands of the enemy.”—ARNOLD.

point: the principle is admitted on all sides; it is embodied in our laws against cruelty to animals, and the sentiment finds a ready response in all hearts which are not dead to the instincts of common humanity. Nevertheless we are told, and especially of late, that we must forego this claim of our animal friends to exemption from torture, in the interests or supposed interests of certain gentlemen, who assure us that they are in the pursuit of science; that the pain they inflict is trifling to a degree; that anaesthetics are for the most part employed, and that they have made discoveries which have benefited the human race. It therefore behoves us to ascertain how far these statements are worthy of credence, and to what extent, if at all, they may lead us to condone acts and deeds which we should certainly, *a priori*, condemn as atrocious to the last degree.

Well, here is a specimen of what is meant by the pursuit of science from a vivisector's point of view. It is called a moral experiment. "I inspired," says the late Dr. Brachet, Professor of Physiology at the Ecole de Medicine, of Paris, "a dog with the greatest aversion for me, by plaguing or inflicting some pain or other upon it as often as I saw it. When this feeling was carried to its height, so that the animal became furious as soon as it saw or heard me, I put out its eyes. I could then appear before it without its manifesting any aversion. I spoke, and immediately its barkings and furious movements proved the passion which animated it. I therefore destroyed the drum of its ears and disorganized the internal ear as much as I could, and when an intense inflammation which was excited had rendered it deaf, I filled up its ears with molten wax. It could no longer hear at all. Then I went to its side, spoke aloud, and even caressed it, without its falling into a rage: it seemed even sensible of my caresses." Dr. Brachet repeated the same experiment on another dog, and assures us that the result was always the same.

Here is another, also called a moral experiment, which I quote from a speech by Dr. Shaw, delivered quite recently before the Royal College of Surgeons of Ireland, "The operator began by treating the animal kindly and winning its love and confidence. When these were secured he cut off an ear of the dog, who looked astonished but manifested no resentment. Next day he cut off a paw, and a few days afterwards another. Thus he went on from one outrage to another, slashing and stabbing till the experiment was complete. It was astonishing how much the animal endured before his confidence was gone and his love turned to hate. After the second paw was removed he continued

to gaze up into his master's face, and to lick the hand that maimed him." Here is another which belongs to the same category, and is recorded by Baron Weber, a distinguished scientist, who tells us that a German gentleman cut out the puppies from a pregnant bitch and laid them before the mother. He wished, he said, to ascertain whether she would exhibit affection for them such as is usually displayed when they are born in the natural way. When Mr. Lawson Tait announced the fact that the peritoneum was capable of digesting the immature foetus in cases of ectopic gestation, he tells us that certain German vivisectors put his assertions to the test by cutting out the immature puppies of pregnant bitches and stitching them in the cavity of the peritoneum. "I recall to mind," says Dr. Latour, who was present at the time a poor dog, the roots of whose vertebral nerves Majendie desired to lay bare to demonstrate Bell's theory which he claimed as his own, "the dog mutilated and bleeding *twice* escaped from under the implacable knife, and threw its front paws around Majendie's neck, licking, as if to soften its murderer and ask for mercy. I confess," says Dr. Latour, "I was unable to bear that heart-rending spectacle."*

A similar scene is recorded by a student who was present at an experiment in this country. The dog, alarmed at the awful preparations, sat up and begged for its life of each assistant in turn. The students, moved at this pathetic appeal, endeavoured to save the poor creature, and offered to buy it, or do anything in order that it might be set free, but in vain; it was cruelly tortured, and reproduced at the next lecture for a repetition of the process, under which it died. "Repeated electrical stimulation," says the Editor of *The Lancet* (Sept. 17th, 1881), "appears to produce in rabbits a state of tetanus arresting respiration, which may be kept up artificially." In respect of dogs, the following account is given of those experimented on by M. Richet. "In the dogs," he says, "the electricity employed was not sufficiently powerful to arrest respiration, and death was due to elevation of temperature. The ascent of the thermometer was extremely rapid, so that after the *tetanus* had lasted for *half an hour*, the lethal temperature of 111 or 112 degrees Fahrenheit was reached. The proof that the increased body

* The same man, M. Majendie, lecturing to his class on one occasion with a toy greyhound fawning on his knee, remarked, "Gentlemen, the skin is a sensitive organ." He then slashed his pet with a sharp bistouri the creature uttered a piercing cry. "That scream, gentlemen," said the eminent professor, "proves the truth of my assertion."

heat was the cause of death, was furnished by the fact that if the animals were kept cool by artificial means they will bear for *more than two hours* extremely strong currents, which cause severe tetanus without dying for some days. The breathing is so frequent that it is hardly possible to count it, and so feeble that scarcely any air enters the thorax." These miserable animals were thus subjected for two hours at a time to currents of electricity which caused such intense agony of cramp and heat together, that they either expired with their blood fourteen degrees above the normal temperature, i. e., simmered as it were in their own vital fluid, or lingered for a day or two, having been kept cool by ice baths and other artificial means during their hideous torture.

An eminent London physician, in the Appendix to the Report of the Royal Commission, describes an experiment, of which the following is a brief summary. The subject, a dog, having been rendered motionless with curara, had its windpipe cut open, a nozzle inserted, and artificial respiration maintained by means of bellows ; its head was then partially flayed, its spinal marrow cut through, needles dug into the exposed marrow, and shocks given by a galvanic battery. The nerves which lead from the brain to the heart were then burnt away, and the spinal marrow further stimulated. The doctor says, this *beautiful* and simple experiment we owe to a German physician, with whom I had the pleasure of repeating it here *very frequently* last summer."

In Pflüger's Archives of Physiology is recorded several cases of operations on the brain. "A very clever, lively, young female dog, which had learnt to shake hands with both fore-paws, had the left side of the brain washed out through two holes on the 1st of December, 1875 ; this caused paralysis of the right paw. On being asked for the left, the dog immediately laid it in my hand. I now demanded the right (says the Professor), but the creature only looks at me sorrowfully, for it cannot move it. On my continuing to press for it, the dog crosses the left paw over and offers it to me on the right side, as if to make amends for not being able to give the right." You would think that was enough torture to inflict upon one affectionate little creature; but, no ; on the 13th of January more brain was sucked out with a pump. Even that was not enough ; for on February 15th more was extracted, and on March 6th some more. You will wonder why it did not die ; well, it did, for the last operation killed it. Fifty-one dogs had their heads pierced in several places, and portions of the brain washed out by this process, which was

repeated again and again ; the animals being kept in sore pain and trouble, as we can well imagine, as long as they survived, which was sometimes for weeks or months. Further details are given of what are called interesting experiments on a delicately formed little bitch, the left side of whose brain was extracted ; the hind feet were then clamped with sharp pincers, which caused doleful whining, piteous howling, and foaming at the mouth. The poor creature soon became blind, and shortly afterwards died. "The brain," says the Professor, "was found on dissection to resemble a newly hoed potato field." Another dog who had had five holes bored in its head, and nearly half the brain extracted, lived from February 14th to March 15th. In several of these cases the animal became blind on one eye, and in order to correctly estimate the failure of sight in this blind, or fast becoming blind eye, the Professor took out the other eye. "On the 8th of November, 1875," he says, "two holes were bored in the head of a bull dog, and the brain washed away ; the animal became blind on the right side ; I therefore, on December 11th, took out the left eyeball, so causing complete blindness." On the 10th of January, 1876, some more of this poor creature's brain was destroyed, and on the 5th of February some more ; this time on the opposite side. A few days later this one more unfortunate victim sank from exhaustion. Here is another strange experiment, also recorded in Pflüger's Archives. The spinal cord of a strong grey poodle was cut on the 27th of February, and again on the 13th of March, 1875. The second cutting caused fearful ravages ; the bladder becoming paralyzed, and the rectum protruded. As it appeared that it could not live long, PREPARATIONS WERE MADE TO PERFORM UPON IT FURTHER EXPERIMENTS ; but the dog died before the preparations were completed.

Here is another strange experiment, recorded by the operator himself in the *Revue Nationale*, who tells us that he fastened several large dogs on a table and beat them with a heavy wooden mallet, striking the animals thirty-two times on one side, and again thirty-two times on the other, after which he dislocated both shoulders and fastened the limbs behind the animals' backs. He adds that he did this without anaesthetics, so that he might know how much pain was inflicted from the creatures' cries, and also because, he adds, we know the generous nature of the dog, who will at night lick the hand that in the morning had been employed in striking him with a heavy wooden mallet.

At page 204, of the Report of the Royal Commission on

Vivisection, you will find an experiment on an animal under curara (the most cruel of all poisons, and which, although it paralyzes motion, only heightens sensation), is recorded. The subject was a small docile dog, which, a few minutes after the drug was injected under the skin, staggered on its fore paws, walking on the tips of its toes until it fell over, frothing at the mouth and weeping abundantly. Its windpipe was then slit open and the nozzle of a bellows connected with a gas engine used for artificial respiration inserted. The side of the neck, the side of the face, the side of the foreleg, and interior of the belly were then dissected out, and the sciatic and other nerves exposed and irritated with galvanic shocks. No anaesthetic was used, and the agony the poor creature endured must have been awful; yet it was continued for ten hours, at the end of which time the operators left for their homes; but they did not release the subject of the experiment, or end its sufferings by death. It was purposely left helpless and mutilated as it was, in order that they might resume their investigations next day without preliminary delay. When the next day came the poor dog was dead; the machine was at work (as it is, I am told, in these laboratories often night and day), but it was pumping air into and out of a dead body.

Here is a pathetic scene, recorded by Dr. John Clarke at the Church Congress. A surgeon operated on a dog, cutting out a part of the bowels and stitching the ends together. The operation was done under anaesthetics; but operations on the abdominal cavity entail at best much suffering, even when the patient receives the most assiduous nursing; but what about the nursing of a vivisected animal? it is left fastened to a board, generally the board on which it has been dissected. The *second* night after the operation in the case in question the animal lay there groaning and crying in pain. Its cries attracted another dog in the laboratory which was waiting the same fate. This one broke loose from its tether, and went to help its wounded companion. It first gnawed through the cords that bound it, and then thinking apparently that the dressings were the cause of the pain, the dogs tore them off. They then ran round the laboratory together through the night, until the wounded one dropped from exhaustion, and was found in a dying condition from peritonitis at ten o'clock the next morning.

It may be alleged that these are exceptional experiments, not likely to be repeated, but I cannot admit that such is the case. The last experiment was the one it was proposed to repeat upon

a vast number of dogs at our University Buildings ; and it is not many weeks since a French surgeon poured boiling lead into a dog's ear, regardless of the frantic screams and struggles of the poor creature who tore its limbs in vain efforts to escape. I said this kind of thing is going on every day, and it must be so when you have your laboratory and your licence and your stables and your cages and your dogs and cats and rabbits and horses and assistants and torture troughs and gas engines for artificial respiration, and onkometers and onkographs and the various instruments supplied by the Scientific Instrument Company, which I am assured does a large trade. The vivisecting professor must do something to justify his existence and deserve his pay in that capacity, and here is a description of what he does, which I quote from the pen of an eye witness and participator, who repented his share in the proceedings, as I make bold to think most must do when advancing years forces them to calm reflection, and, as in many instances, to bitter retrospection.* "I venture to record," says Dr. Hoggan, "a little of my own experience in this matter, part of which was gained as an assistant in the laboratory of one of the greatest living experimental physiologists. In that laboratory we sacrificed daily from one to three dogs, besides rabbits and other animals, and after much experience I am of opinion that not one of those experiments on animals was justified or necessary. The idea of the good of humanity was simply out of the question and would have been laughed at, the great aim being to keep up with, or get ahead of, one's contemporaries in science, even at the price of an

* When Dr. John Reid met his friend Fergusson (afterwards Sir William) in the street, he burst into tears and exclaimed, "This is a judgment on me for my cruelties to animals." He was a fine, handsome, powerful man, in the prime of life, and the grave suddenly yawned at his feet. He was doomed to die, and shortly, of cancer of the tongue, an organ in the region of which his vivisections had been mainly directed.—Professor Syme, probably the greatest operator of this century, the Napoleon of surgery, lived to denounce vivisection as cruel and useless.—Pirogoff, the great Russian surgeon, tells us how his dying dog, in midst of his sufferings and at the point of death, fixed his plaintive eyes upon his master, and made an effort to give a last sign of recognition to one who tells us how he suffered when he remembered the tortures he had inflicted upon hundreds of other dogs. He says, "My heart was full."—Professor Haller records a precisely similar experience; so does Dr. Crisp; and so does Sir Charles Bell, who greatly regretted one or two experiments he was compelled to perform in order to illustrate his discovery made from anatomy only of the spinal nerves. He says, "It is but a poor manner of acquiring fame, to multiply experiments on brutes and take the chance of discovery; we ought, at least, to get at truth without cruelty, and to form a judgment without having recourse to torture."

incalculable amount of torture, needlessly and iniquitously inflicted on the poor animals. During three campaigns," he adds, "amidst the horrors of war, I have witnessed many harsh sights, but I think the saddest sight I have ever witnessed was when the dogs were brought up from the cellar to the laboratory for sacrifice. Instead of appearing pleased with the change from darkness to light they seemed seized with horror as soon as they smelt the air of the place, divining apparently their approaching fate. They would make friendly advances to each of the three or four persons present, and as far as eyes, ears, and tail could make a mute appeal for mercy eloquent, they tried it in vain. Were the feelings of experimental physiologists not blunted, they could not long continue the practice of vivisection. They are always ready to repudiate any implied want of tender feeling, but I must say they seldom show much pity; on the contrary, in practice they frequently show the reverse. Hundreds of times I have seen when an animal writhed with pain, and thereby deranged the tissues during a delicate dissection, instead of being soothed it would receive a slap and an angry order to be quiet and behave itself. At other times, when an animal had endured great pain for hours without struggling or giving more than an occasional low whine, instead of letting the poor mangled wretch loose to crawl painfully about the place in reserve for another day's torture, it would receive pity so far that it would be said to have behaved well enough to merit death; and, as a reward, would be killed at once by breaking up the medulla with a needle. One of the most revolting features of the laboratory was the custom of giving an animal on which the Professor had completed his experiment, and which had still some life left, to the assistants, to practise the finding of arteries, nerves, &c., in the living animal, or for performing what are called fundamental experiments upon it; in other words, repeating those which are recommended in the laboratory handbooks."*

* Baron Weber describes a visit which he paid to a large physiological laboratory when the students and professors were away on vacation. He says he was led into the cellars, where iron boxes are kept for securing the dogs till wanted; they were capable of holding fifty dogs. He asked the conductor where they came from. "Oh, from the dealers and so on," with a grin. The Baron advises those who are fond of animals not to let their dogs go unguarded in the streets. One intelligent looking dog, with evident forebodings, had gnawed a considerable hole in one of the oaken doors of his cage, in the hope of escape. The Baron's guide said it would not help the blackguard, for if he got loose he could not get out of the place. The long tables were smeared with blood. He also describes the torture troughs, and

"I have known," says Dr. Allix, the well-known French veterinary surgeon, "dogs die of sheer terror in anticipation of their doom before the vivisector had time to commence his operations."

"The experiments lately performed on female dogs will continue to haunt and distress me to the last day of my life," says Dr. De Noë Walker, late army surgeon, who gave evidence before the Royal Commission. "As soon as the poor mother had given birth to a litter of puppies, the vivisector visited her on her bed of straw, whereupon, moved by the finest feelings of her nature, she looked up into his face, her dilated pupils beaming with joy and expectant sympathy. Up he lifts her and presently excises all her mammary glands. The next day she is again visited by her tormentor, but on seeing him her terror is indescribable. The poor puppies were of course starved to death."

"It is marvellous and astonishing," says Professor Goltz, "to find that a dog that had served for some seven experiments and whose hind quarters were completely paralyzed, and whose spinal marrow had been destroyed, the animal suffering besides from fatal peritonitis, was still capable of maternal feelings for its young. She unceasingly licked the living and the dead puppy, and treated the living puppy with the same tenderness as an uninjured dog might do."

remarks that the last dog who died in this way had been honored with a *memento mori*, for on one of the ends of the box a student had drawn in chalk the head of a pretty little dog with angel's wings attached to his shoulders, and the legend written underneath, "*Requiescat in pace.*" On asking if the animals were rendered insensible before being experimented on, the Baron was told that they were all poisoned with curara. "My guide now led me into a another very small, cold room, in which were two large freezing boxes. One, a large, round tub, my guide said, was 'for freezing a live dog till he became quite stiff.'" A cold shudder creeps over one when one thinks of the poor terrified and whining animals, after being kept for weeks in these gloomy cellars, being thrown at last into a tub to be frozen stiff. Dogs frozen in this way at intervals, live to the sixth day.—*See Report of the Imperial Rudolph Institution for 1869, p. 112.*

Dr. Leffingwell records the following exhibition, recently made before an American audience. "It was affirmed on one occasion by a Professor of Physiology before his class, that the fur of animals prevents radiation of animal heat and is thus a protection against cold, and that an animal deprived of fur, or with that fur rendered useless by varnishing, would suffer if exposed to extreme cold." No one out of a lunatic asylum could doubt this; yet three animals were brought in,—one shaved, one varnished, one untouched; the three were then packed in ice. No anaesthetic was given; their piteous moaning gradually grew fainter, and at last ceased altogether. They were then unpacked: one was dead, the two others, frozen stiff, were resuscitated for other experiments, i.e., FURTHER TORTURE, ON ANOTHER DAY.

"I will take," says Mr. R. T. Reid, in his speech in the House of Commons, "a series of experiments performed by Professor Rutherford of the University of Edinburgh, and reported in *The British Medical Journal*. These experiments were thirty-one in number; no doubt there were hundreds of dogs sacrificed upon other series of experiments, but now I am only referring to one set. There were in this set thirty-one experiments, but no doubt many more than thirty-one dogs were sacrificed. All were performed on dogs, and the nature of them was this. The dogs were starved for many hours, they were then fastened down, the abdomen was cut open, the bile duct was dissected out and cut; a glass tube was tied into the bile duct and brought outside the body. The duct leading to the gall bladder was then closed by a clamp, and various drugs were injected into the intestines at its upper part. The result of these experiments was simply nothing at all—I mean it led to no increase of knowledge whatever, and no one can be astonished at that; because these wretched beasts were placed in such circumstances—their condition was so abnormal—that the ordinary and universally recognized effect of well-known drugs was not produced. These experiments were performed without anaesthetics."

Sir W. Fergusson, in his evidence before the Royal Commission, gives an instance of a dog who was crucified for several days, and brought into the class from time to time to show how the experiment was going on. Evidence was also given that dogs and rabbits had the nerves that govern the muscles of the throat divided, so that they could not swallow the food that was placed before them; they kept on continually munching, but all the same they died of hunger. Dr. Crisp, in his evidence before the same Commission (Q. 6,157), alludes to the well-known cases of vivisection that were practised at the veterinary schools of Alfort, Lyons, and Toulouse. Sixty-four operations were performed upon the same living horse; eight students would be engaged on the same animal at the same time; five or six horses were used up in this way in a week; and no anaesthetics were employed. The operations commenced at six o'clock in the morning, and ended at six at night. The eyes were cut out, the teeth punched out, the hoofs torn off, the body fired, and every conceivable operation upon nerves, arteries, veins, bladder, and skull, was performed upon the groaning, writhing beast; and it was considered highly creditable to the young students if they could keep the animal alive until the last, i. e., until six at night.

Here is a report from an eye-witness, Dr. Murdoch, of what

actually occurred upon one occasion. "A little chestnut mare, worn out in the service of man, had unfortunately survived the numerous tortures of the day and no longer resembled any creature of this earth. Her thighs were cut open, the skin torn away, ploughed through with hot irons, harrowed with dozens of setons, the sinews cut through, the hoofs torn off, and the eyes pierced. In this blind and powerless condition the miserable creature was placed, amid laughter, upon its bleeding feet, to shew those present who were operating upon seven other horses, what human skill could perform before death released their victim."

It seems incredible, but it is a fact that Abdul, the celebrated beauty, the horse that bore the late Emperor of Austria at his coronation, was, at the close of his career, worn out and feeble, subjected to this hellish process.

Dr. Carpenter mentions in his work on Physiology, a professor who inserted a tube into a dog's stomach and then filled it with boiling water. A number of cases are also reported where dogs were covered with turpentine and then set fire to (burnt alive). Others, where full-grown sheep dogs have been immersed up to the neck in boiling water, and kept as long as they would live afterwards; others, where they were kept for weeks without food; others, where quite a number of dogs were skinned alive. The Professor fully describes the process, complains of the difficulty he experienced in flaying the paws and head, and tells us that he kept them in cotton wool so long as they would live after the operation. Others, where dogs and cats were subjected to atmospheric pressure until they became as stiff as boards, and their brains ran like cream; others, where the kidneys were cut out and the animals kept alive as long as possible; others, where the bladder was ligatured to prevent the discharge of urine, the gullet tied to prevent sickness after emetics or poisons had been administered, and others where the natural vents had been permanently clamped; others, where animals were baked alive or trephined and their brains sucked out with a force pump or burnt out with hot wires; others, where dogs were suffocated and brought to life again and again, and kept alive for weeks and months for a repetition of the process. Similar experiments on apes, monkeys, cats, rabbits; in short, on every creature that has life and can feel, are recorded; while other unfortunate animals were submitted to an unintermitting torture of every conceivable description (without injuring vital parts) for weeks, merely to ascertain how much actual pain it took to kill them. And so on, horror upon horror's head accumulating, until one is

sick with grief, indignation, and disgust at the whole business.

I think I have said and quoted enough to show that the science of which the vivisector is in pursuit, is not true science, and that the pain inflicted by him on his innocent victims is not slight, but atrocious to the last degree. Let us now see what is meant by the assertion that anæsthetics are employed. Dr. Hoggan says that anæsthetics have proved the greatest curse to vivisectible animals, and I entirely agree with him. The public would not tolerate vivisection for a day if they did not believe that the animals were rendered insensible, and the plain fact is that they are not rendered insensible; more than half the licences dispense with anæsthetics. It is the public who are anæsthetised,—it must be so; for in many experiments, to render the animal insensible would be to defeat the object of the operator, such as those, for instance, connected with the reflex action from the sensory nerves; those connected with the glandular secretions, as in Hughes', Bennett's, and Rutherford's experiments on the liver; again, those on digestion, and those on the temperature of the heart and arteries, and those in which it is necessary to use a gas engine for artificial respiration; those on the phenomena of pain; the boiling, baking and stewing alive experiments; drowning, starving to death, alcoholisation, and feeding on substances which are incapable of sustaining life. It is the same when the effects of drugs and poisons have to be tested; and also in a numerous class of experiments which require time—days, weeks, or months—for their completion. The animal, if it goes to sleep, goes to sleep in health, in ease, to awake in torment that can only end with its most wretched life. And again, when an operation is performed and the animal is kept alive, often in great agony, in order that the results may be observed, as in numberless operations and in all pathological experiments. Besides it is most difficult to render an animal insensible and at the same time keep it alive. Vomiting frequently interrupts the process, during which the animal comes round, and my experience with chloroform on dogs is that as soon as they are insensible they cease to breathe, and this experience is borne out by that of Professor Pritchard of the Royal Veterinary College, a gentleman who has had more experience in this direction than any man living, who says, in effect, that as soon as the animal is insensible you find that it is dead. "They appear for some time not to be under the influence of it at all, and then suddenly they come under the influence of it, and we find it impossible to bring them round." The practical consequence of

this is, as Dr. Hoggan has remarked, "that complete and conscientious anaesthesia is seldom even attempted, the animal getting at most a slight whiff of chloroform, by way of satisfying the conscience of the operator or of enabling him to make statements of a humane character." Dr. Walker's evidence before the Royal Commission was to the same effect. He said, "It is quite true that anaesthetics are used, but if by that you understand that while the animal lived and was experimented on he was throughout insensible, it is the greatest delusion that ever was." Physiologists are well aware of these facts, hence you find it stated that they occasionally use ether; but it is very difficult, owing to the conformation of face and the necessity for tying the mouth up, to give ether to dogs, the animals principally operated on; you require to smother them, and if the anaesthetic is intermitted for a moment they come round; and we consequently find it stated that the ether has been supplemented by morphia injected under the skin, which, although it stupefies, does not prevent the animal from feeling. "Il sent la douleur," as Bernard says. Or, worst of all, curara—"the hellish wourali," as Lord Tennyson very properly calls it,—a drug which makes it impossible for you to give chloroform safely, or to say whether the animal is insensible or not, since all the muscles of expression are paralyzed, and which, while it paralyzes motion, actually increases the animal's susceptibility to pain—pain described by Claude Bernard himself, as "the most atrocious the mind of man can conceive."

So much for anaesthetics and the slight amount of pain inflicted by vivisectors. Now let us see what benefits the human race, our noble selves, have derived from these diabolical torments inflicted upon our innocent and helpless fellow-creatures. Dr. Hoggan says the idea of benefit to the human race would be laughed to scorn by the vivisector, the sole object being to get ahead of one's contemporaries in science. I do not say that any benefits would justify us in inflicting these torments; they would no more justify us than an increased price would justify the man who skinned cats alive in order to preserve the gloss of their coats. But I want to know what they are and where they are. I confess I do not know, although I have tried hard to find out.

" My soul
 Assures me humanity is wisdom,
 And they who want it, wise as they may seem,
 And confident in their own sight and strength,
 Reach not the scope they aim at."

If you ask those who support vivisection what this Joanna Southcote of science has brought forth, they either talk unmitigated nonsense or favour you with vague, unmeaning generalities which are little less absurd. Here is a specimen of the latter which I cull from a recent letter by an able practitioner, apologising for the system: "Have any of your correspondents," this gentleman says, "thought seriously of the law of prey and the struggle for life which is going on everlasting in the world around us? Tennyson's 'Nature red in tooth and claw' depicts in not too vivid colouring the scene of the cosmos. Do we not see how all through the realm of animal life destruction and suffering are the means by which advancement is made from a lower to a higher and more complex organization; how the principle of sacrifice seems to run like a shining thread through the web of the universe, interwoven into its very order. When we stand on the place where innumerable multitudes of living sentient things fall a prey to the conditions of development which are set up by the Maker, surely we shall not be unwilling to yield to a few earnest seekers after truth the means of gaining that knowledge which is to lessen so considerably that sum of suffering which is one of the heaviest curses of the world." The writer continues: "Our sympathies for the mangled victims of the sportsman's pleasure are shadowed by the lurid picture which Miss Cobbe's impressionist brush makes for us; and yet the horrors of the laboratory are a mere fiasco in extent to the dreadfulness of the deeds which are done in the fields for our own good and pleasure. In the light of the latest results of brain surgery; of protective inoculations; of the discoveries of Virchow, Pasteur, Lister and Ferrier, one is bound to admit the needfulness of experiments if scientific medicine is to advance."

And so on; but what does it all mean? We are not savages contending against a hostile tribe who would torture us; we are not engaged in a struggle for life with wild beasts who would tear us limb from limb; even if we were, torture would not be justifiable. But just conceive the shame of it,—the pity of it. The animal we principally sacrifice is our best friend,—Byron said he never knew but one, and that was his dog Boatswain;—our faithful companion who loves, honours and obeys us; who has given his life for us a thousand times; who is eager at any moment to imperil life and limb in our service; who has even been known to die of grief on his master's grave, and to starve to death in the open rather than cease to guard his dead body. Let me beg of you, if only for the honour of our noble profession,

to think of the sin involved—of the cruelty involved—of the treason, of the cowardice, of the utter pitilessness involved—as Miss Cobbe has remarked, in tying down this faithful friend on a torture trough, and slowly mangling its brain, its eyes, its entrails, until after hours—it may be days or weeks—of the most exquisite torture, he perishes in a degree of agony of which we can form no conception. Surely, if there is a future—surely, if man is responsible—surely, if it is the merciful that shall obtain mercy,—it is not kind of us to allow our misguided friends to go on with this bloody work, or to bow down to those eminent men in our own profession who would conduct our youth into the same path which, if there be any truth in religion, can but lead to destruction.

Ye therefore who love mercy, teach your sons
 To love it too. The springtime of our years
 Is soon dishonoured and defiled in most
 By budding ills, that ask a prudent hand
 To check them. But alas! none sooner shoots
 If unrestrained, into luxuriant growth
 Than cruelty, most devilish of them all.
 Mercy to him that shows it is the rule
 And righteous limitation of its act
 By which heaven moves in pardoning guilty man;
 And he that shows none, being ripe in years,
 And conscious of the outrage he commits,
 Shall seek it AND NOT FIND IT, in his turn.

Compare, I say, the horrible tortures which I have described and thousands of others of a similar character which are going on day and night in the licensed laboratories of this country and abroad, with the shot of the sportsman or the sudden death in hot encounter, which is the fate of so many of the lower animals, and tell me if it is not simply absurd to declare that “the horrors of the laboratory are a mere fiasco in extent to the dreadfulness of the deeds of the sportsman,” or those of nature herself. Besides, if the cruelties of sport are to be deprecated, how much more must all right-minded persons condemn deliberate, cold-blooded and prolonged torture, no matter for what selfish purpose it may be perpetrated? As to the discoveries by vivisection that have benefited the human race, it has been proved over and over again that Pasteur’s inoculations, both in anthrax and hydrophobia, have done infinite harm and not the slightest good; Lister’s antiseptic system was worked out, as everyone knows, in the hospital, at the bed side, and, to the best of my belief, quite independently of experiments on animals—in fact, they would have been quite out of place; and as to Ferrier’s cruel mangling of dogs’ and monkeys’ brains, why, such operations have taught

us nothing but what equally good and better authorities have, and I believe with justice, declared to be both false and misleading. How then is it, you will very naturally enquire, that the British Medical Association should pass a resolution declaring "that experiments on living animals are of inestimable benefit to man and animals, and that the continuance and extension of such investigations is essential to the progress of knowledge, the relief of suffering, and the saving of life?" How, indeed! Well, the passing of such a resolution, which in my opinion is a libel on the British Medical Association, is accounted for, first, by the fact, to which Mr. Jonathan Hutchinson, the proposer, alluded, that probably not one in one hundred of those present had ever performed any experiments on animals at all; and I will add, since they were educated and refined gentlemen, that they also probably had not the remotest idea of what they were doing; secondly, by the fact that, owing to the shortness of the notice, equivalent to no notice at all, the resolution was sprung upon the meeting, and there was consequently no discussion and no opportunity of opposition; and third, that those who were present and who were opposed to vivisection did not like to appear singular, and as one of them remarked to me, "be the only ones to stand out."

Let us see now what arguments were adduced in favor of this ridiculous proposition. Mr. Hutchinson said, first, that the members of the Association ought to pass the resolution because those persons who practised vivisection were exposed to a certain amount of odium and ought to be protected. Second, that experiments on animals were not cruel, because nothing deserved the definition of cruelty which had for its object the alleviation of suffering. Third, that Sir William Gull had said that "there was no cruelty comparable to ignorance;" and fourth, that those who were opposed to vivisection were like certain whelk shells turned the wrong way. Dr. Ransom, the seconder, merely added that the right to vivisect was a matter of privilege or liberty, and that "the price of liberty was eternal vigilance,"—in fact it was "whelks and liberty over again." But what did it all amount to? Persons who practise such cruelties as I have described must be expected to be exposed to odium; and it is certainly not the business, even if it were in the power, of the British Medical Association to protect them. Moreover, cruelty is cruelty with whatever object it may be perpetrated; and it is an insult to common sense to pretend that the man who flays dogs alive by the score is not cruel simply because he says he is trying to find out something about the functions of the skin. Sir

William Gull's pompous remark really meant nothing at all ; and the eccentric persons who are compared to sea shells turned the wrong way are, as Sir John Stuart Mill has remarked, really the excellent of the earth ; they are the men and women who accomplish all good and useful ends, not by going with the stream like dead fish, but by buffeting the tide.

No, Sir, no good ever came of vivisection ever since the world began ; and in my humble opinion no good ever can. Never mind what physiologists say ; as Ouida has remarked, the arrogance, the conceit, the sophisms of the so-called scientists of to-day are as like the arrogance, the conceit, and the sophisms of the Bidas and Torquemadas of old, "as the Physiological Laboratory is like the Torture Chamber of the Inquisition." We have got rid of one, and we shall get rid of the other. Meantime, never let it be said that we as a Profession were on the side of wrong, of cruelty, of injustice and oppression. The main task of civilization has ever been the vindication of the rights of the weak. Animals have rights (so much is conceded by our laws), and men have duties towards them ; and for us to ignore the one, or counsel neglect of the other, is simply to proclaim ourselves enemies of the human race and foes to its destined progress.

The following are the Author's replies to the arguments brought forward in favour of Vivisection, during debate at the close of his paper :—

"NIHIL UTILE QUOD NON SIT HONESTUM."

THE CIRCULATION OF THE BLOOD.

It is true that Harvey was a vivisector, but it is not true that he discovered the circulation of the blood by means of vivisection ; on the contrary, so long as he confined his attention to vivisection he was continually wading through blood, agony, and torture only to arrive at doubt, uncertainty, and contradiction. Here are his own words : "When I first gave my mind to vivisection as a means of discovering the motions and uses of the heart, and sought to discover these from actual inspection and not from the writings of others, I found the task so truly arduous, so full of difficulties, that I was almost tempted to think with Frascatorius that the motion of the heart *was only to be comprehended by God, my mind was therefore greatly unsettled*, nor did I know what I should myself conclude, nor what believe from others." He adds "I was led to distrust the existing belief of the course of the blood by CONSIDERING THE ARRANGEMENT OF THE VALVES OF THE VEINS (which of course could only be studied on the dead body). It was plain that the common doctrine that the blood moved to and fro

in the veins outwards from the heart and back again was incompatible with the fact of the direction of the valves which are so placed that the blood could only move in one direction." Now, as Dr. Bridges, the Harveian orator for this year (1892), has pointed out, "Servetus and Colombo had demonstrated before Harvey that the blood passed from the right ventricle through the lungs to the left side of the heart; and Cesalpino had shewn that in consequence of the arrangement of the mitral and aortic valves, the flow of blood must necessarily be from the left ventricle towards the various organs of the body."

This could not be demonstrated on the living body, as Dr. George Macilwain, Fellow of the Royal College of Surgeons, remarked in his evidence before the Royal Commission (Blue Book, p. 96), "You could not discover the circulation in a living body; I do not see how it is possible to do so; if you had a dead body then it is so easy to discover the circulation of the blood, that it is difficult to understand how it was not done before (Harvey's time), because if you inject the arteries you find that the fluid is returned by the veins." That is the simple truth; whereas, if you attack a living animal, you are at once blinded by the blood which gushes forth at the first incision, and can make nothing out. "Harvey himself," says Dr. Lauder Brunton in his Gulstonian Lectures (*British Medical Journal*, March 17, 1877), "was led to form his ideas regarding the course taken by the blood from the position of the valves of the veins, and might possibly have been able to discover it exactly without making a single experiment." Similar evidence before the same Commission was given by Dr. Acland, Regius Professor of Medicine at the University of Oxford; and "The more Harvey's immortal work is studied," says Dr. Bridges, "the more palpable is the fallacy that his discovery resulted from any such process of direct inspection as vivisection is supposed to give. Comparison of structures—direct observation of structures—these supplied Harvey with his materials, and profound meditation did the rest."

THE CURE (SO-CALLED) OF HYDROPHOBIA.

It is true that Pasteur discovered, if we can call it a discovery, his so-called cure for hydrophobia by vivisection; but it is not true that his so-called cure is any cure at all. On the contrary, it is pretty clearly established by now, that Professor Michel Peter's observation, made years ago, is strictly correct: "M. Pasteur ne guerit pas la rage, il la donne,"—"he does not cure hydrophobia, he gives it." Here are the latest figures in proof thereof, which I quote from an excellent address on the subject, delivered at the recent Church Congress by Dr. F. S. Arnold, M.B. and B. Ch. Oxon:—"The report of the French Conseil Superior de l'Hygiène shows that from 1850 to 1885, the average annual mortality from hydrophobia in France was 28; from 1885 to 1890 inclusive, after Pasteur started his inoculations, there was a yearly average of 39 deaths in the same

country, and under precisely similar conditions." "In England the deaths from hydrophobia from 1880 to 1884 inclusive, were 153, while those from 1885 to 1889—years during which many persons bitten by dogs were sent from this country to Pasteur—were 159, giving a full addition of one to the yearly average." In addition to these conclusive facts, showing the utter failure of Pasteur's inoculations to diminish the number of deaths from hydrophobia, we have the fact that close upon 240 persons have died after having submitted to his treatment, and many of these clearly in consequence of it.

THE PREVENTIVE TREATMENT (SO-CALLED) OF ANTHRAX.

It is true that Pasteur discovered his so-called preventive treatment of anthrax by experiments on animals, but it is not true that his inoculations have been of any service, or anything, when faithfully carried out, but a source of danger and disaster wherever they have been adopted. Indeed so clearly has this been demonstrated, that his system has been emphatically condemned by the German and English Commissioners appointed to enquire into it, and actually prohibited (as it ought to be in this country) by the Hungarian Commission, and for the following reasons:—
 1—Because the spores of anthrax are so indestructible that, once started, it is almost impossible to get rid of them; they will survive immersion in solutions of the most powerful chemicals, such as corrosive sublimate and carbolic acid, and will even resist the action of boiling water (unless the ebullition is continued for upwards of five minutes—see report of experiments in Bacteriological laboratory, Berlin, quoted in *Medical Press*); and because they will also live in pastures for years, through all weathers, and prove as fatal both to man and beast at last as at first.
 2—Because when the spores and bacilli of this microbe are injected into the cellular tissue of a healthy animal, its blood, its nasal and buccal mucous discharges, its excrement, and secretions are speedily swarming with bacilli, and it is at once scattering the seeds of this malignant and loathsome disease wherever it goes.
 3—Because it is simply absurd to suppose that any protection can be gained in this way, because one attack of anthrax, malignant pustule, and splenic fever, as it is also called,—unlike scarlet fever, measles, and such like diseases,—confers no immunity against another attack.
 4—Because even the advocates of the system do not claim protection beyond a short period (a few months), and insist that the operation must be constantly repeated.
 5—Because ten per cent. of the animals, even under favourable circumstances, die, and those who recover do so with their health permanently damaged.
 6—Because the flesh, the milk, the butter, and cheese of such inoculated animals are contaminated and unfit for food.
 7—Because the operation has proved fatal to a vast number of animals. M. Paul Bouillier, for instance, says that inoculation for anthrax has had but one result—that of causing the death of ten times more animals in

France than are lost annually in the natural manner. Among hundreds of examples, he cites three. M. Grandchamps, he says, lost 5,000 francs worth of horses and cows from inoculation. M. Fournier inoculated 400 sheep, of which 90 died ; the mayor of St. Germain and M. Marcel le Brun lost between them as many sheep as have died in thirty Communes where no inoculation goes on, and 45 times more than were lost by five other farmers who own sheep in the same district where no inoculation is practised. It is by millions, he says, that we must count the losses in France from anthrax inoculation. It is said that the system has since been perfected ; but M. Lutaud, in a recent communication, tells me that French farmers have had such disastrous experience, that they now refuse to allow their animals to be inoculated ; and it is not long since the brothers Pankaljeff, Russian millionaires, allowed Dr. Bardach to inoculate their stock, as a result of which proceeding in two days 3,552 sheep died, 1,200 horned cattle likewise perished, and also hundreds of horses.—(*Journal de Médecine*, Paris, 1889). Professor Peter tells us that at about the same time inoculation was practised upon 4,564 sheep at Kachowa in Southern Russia, of which 3,696 died — (*Provincial Medical Journal*, May, 1890) ; and from a report in *The Standard* for July 9th this year (1892), I find that in New South Wales, where M. Pasteur's representatives inoculated a flock of 12,524 sheep, 3,174 died.

8—Because, when these things do not happen, it is simply because the vaccine used has been sterilized down to the innocuity of rain water, and can neither protect or injure ; on which point Dr. Klein, in his Supplement to the Twelfth Annual Report of the Local Government Board (p. 208) remarks :—“ Is a cultivation in which in course of time the bacillus anthracis, at first forming a copious growth, degenerates and in which no spores had been formed, and further which cultivation loses, as we know, its power to infect with virulent anthrax animals when inoculated,—that is to say, such a cultivation as M. Pasteur's vaccine professes to be,— is such a cultivation, I say, perfectly ineffective too, in giving the animals some sort of immunity against further inoculation with natural material ? The answer is, “ Yes ; IT IS PERFECTLY INEFFECTIVE.” And finally, as an eloquent writer has observed, “ Accepting vaccination, however, as a preventive from one disease (small pox), how will it be when we and our cattle employ twenty similar preventives for twenty other diseases ? Is it really to be believed that the order of things has been so perversely constituted as that the health of men and beasts is to be sought, *not*, as we fondly believed, by pure and sober living and cleanliness, but by the pollution of the very fountains of life with the confluent streams of a dozen filthy diseases ? ”

Mr. Fleming indites a psalm of triumph over the prospect of a boundless field of inoculations just opening to the activity of medical men and veterinary surgeons, who will go forth like so many sowers to scratch the people and cattle instead of the

ground, and drop cultivated virus by way of seed, or possibly tares, as the case may prove. Are we then, our oxen, our sheep, our pigs, our fowls,—(that is to say, our bodies and the food which nourishes them)—all to be vaccinated, porcinated, equinated, caninised, felinised, and bovinated, once, twice, twenty times in our lives, or every year? Are we to be converted into so many living nests for the comfortable incubation of disease germs? Is our meat to be saturated with “virus,” our milk drawn from inoculated cows, our eggs laid by diseased hens,—in short, are we to breakfast, dine, and sup upon disease by way of securing the perfection of health?” God forbid!

THE LOCALISATION OF BRAIN DISEASE.

It is true that Professor Ferrier has performed numerous vivisectional operations upon the brains of apes and other animals, and has in consequence arrived at certain conclusions with regard to the functions of certain definite portions of the cerebrum; but it is not true that these experiments have resulted in benefit to the human race, or that the conclusions are trustworthy, or that he has given us any guide on which we can depend in operating upon the brain. On the contrary, cases of brain tumour that are at once accessible and capable of being localised are so extremely rare, that the benefit to the human race of such brain surgery must in any case be very small. Again, those physiologists who have repeated Ferrier’s experiments deny his conclusions, and it is a fact that the only positive knowledge we have as to the functions of the brain has been derived from careful observation of human patients during life, and careful *post mortem* examinations of those who have succumbed after death. Let us examine these points a little in detail. Patients suffering from brain tumour are not very numerous; nevertheless the Morbid Growths Committee of the Pathological Society have collected and tabulated fifty-four cases; of these only two, even under the most favourable circumstances, (i.e., with a certain knowledge of the *locale* of the tumour) seemed on *post mortem* examination to have been suitable for operation; and Dr. Goodhart, physician to Guy’s hospital, who is a great pathologist, says that in thirteen years of *post mortem* work he did not remember seeing a single case in which the tumour was at once accessible and capable of being localised.—(Pathological Society’s Transactions, quoted in *The Medical Press*, Jan. 26th, 1887). He very naturally adds, “That in the region of cerebral tumours other than inflammatory, it therefore seems very doubtful if surgery has any future worth mentioning before it.” Speaking on the same point, the Editor of *The Medical Press* remarks, “That if such cases (prospecting for brain tumours) proved fatal, the jury must give a verdict against the surgeon who operated;” and the Editor of *The Lancet* (November, 1883) says that, “If Dr. Ferrier’s suggestions meet with much practical response, it is to be feared that cerebral localisation will soon have more

deaths to answer for than lives to boast of." It is clear, therefore, that in cases other than inflammatory or resulting from direct injury, where the history of the case, the heat, the pain on pressure, and other local symptoms would guide us, that there is not very much to be done in the way of brain surgery, and that we cannot possibly have derived the benefit which is claimed as a result of Ferrier's experiments on monkeys.

Speaking on this point Sir W. Bowman says, "Vivisections upon so complex an organ as the brain are ill calculated to lead to useful or satisfactory results;" and Ferrier himself, in the preface to his Treatise on the Functions of the Brain, says, "No one who has attentively studied the results of the labours of the numerous investigators in this field of research can help being struck by the want of harmony, and even positive contradictions, among the conclusions which apparently the same experiments and the same facts have led to in different hands." "Indeed experiments on the lower animals, even on apes, often lead to conclusions SERIOUSLY AT VARIANCE WITH WELL ESTABLISHED FACTS OF CLINICAL AND PATHOLOGICAL OBSERVATION."

Again, Ludimar Hermann, Professor of Physiology in the University of Zurich, says, "Physiological experiments conducted in these regions (of the brain) are most indefinite. The usual plan of investigation, viz., that of applying stimuli to the brain substance, leads either to negative results, or, if electrical stimulation is used, to results which, owing to the *unavoidable dispersal of the currents in numerous directions*, are not sufficiently localised to form the basis for trustworthy conclusions." And Dr. Kingsford (M.D., Paris) says, "The conditions under which experimenters are compelled to work render their results liable to great misconception and error. Thus, in order to reach special tracts and areas of the brain, they are forced to push their instruments, whether heated or otherwise, through the superficial membranes and tissues of the hemispheres of the brain lying beneath the skull, and by these acts of laceration or denudation many complications are set up which often seriously interfere with the conclusions sought, making it difficult to determine what proportion of the results obtained may be due to *secondary and unavoidable injuries*." On the same point Dr. Charcot, in his work on the Topography of the Brain, after citing cases, has also said, "These examples are enough to show that, particularly as regards brain functions, the utmost reserve is necessary in drawing inferences from animals to man;" and Professor Goltz, some of whose experiments on the brains of dogs I have quoted, says, "It is not often that physiologists agree on matters relating to the physiology of the brain."

Charcot and Pitres in France,—Hitzig, Munk, and Hermann in Germany,—Luciani and Tambourini in Italy,—and Doctors Schäfer and Goodhart in England—all differ from Ferrier in the conclusions drawn from his vivisectional experiments; and Professor Munk, in his book "*Functionem der Grosshirnrinde,*"

besides rejecting the conclusions of Flourens, Fritsch, Hitzig, Caville, Donet, Nothnagel, Schiff, Hermann, and Goltz, speaks of Ferrier's certainty in his own results as being only equalled by the impossibility of the slightest faith being placed in any of these results by any one who examines his researches ; and Ludwig, whose laboratory at Leipzig is the largest in the world, compares these experiments to injuries to a watch by means of a pistol shot ;* while the Editor of *The Lancet* (Nov. 10th, 1883), commenting on these facts, remarks : "Experiments led Flourens and all the *chief physiologists of the day* to the conclusion that no function was specially performed in any one geographical region of the cortex (of the brain), but that every part subserved the functions of which any was capable, and these experiments were made with as much care and as much skill as those which have led Fritsch, Hitzig, Ferrier and others to conclusions diametrically opposite. Moreover, in the full light of these later researches, one of the most distinguished physiologists of the present day has come to *conclusions not far removed from those of Flourens*, and the author of the most popular text book of physiology now hesitates between the two opinions."

It is thus evident that experimenters are hopelessly at variance with each other, and that we can draw no safe conclusions from what they have done. Are we, then, to repeat their experiments ? God forbid ! that would only render confusion worse confounded. No ; if we wish to get at the truth in this matter, we must simply carefully observe the symptoms of patients suffering from disease of the brain during life, and compare these symptoms with the lesions detected in the cerebral substance after death ; that is the only sure and safe guide to the truth, and it is to it that we owe all that we know FOR CERTAIN now of the localisation of the functions of the brain.

Speaking on this point, Charcot says : "The only really decisive data touching the cerebral pathology of man are, in my opinion, those developed according to the principles of the *Anatomico Clinical Method*. That method consists in ever confronting the functional disorders observed during life in man, with the lesions discovered and carefully located after death. To this method, I may justly say, WE OWE WHATEVER DEFINITE KNOWLEDGE WE HAVE OF BRAIN PATHOLOGY." He adds, "As for the localisation of certain cerebral functions, this method is not only the best, but the only one that can be employed." Again, Dr. Laborde, Professor of Practical Physiology, Paris, says : "The first victory of science over the impenetrable mysteries of the nerve functions—that most brilliant victory, the discovery of the exact seat of aphasia—was the result of bed side experience, which alone could accomplish it." He adds, "The study of this organ, the brain, if it is to bear fruit, MUST BE MADE ON MAN." Ferrier himself adds, the decisive settlement of such points

* See Hermann's "Human Physiology," translated by Gamgee.

must depend mainly on careful clinical and pathological research. "Experiments have led to different results in different hands."

Dr. MacEwen, of Glasgow, located and operated on cases of brain disease with extraordinary success, guided only by observation at the bed side and *post mortem* examinations, before Ferrier's experiments were heard of; and Ludimar Hermann, Professor of Physiology in the Zurich University, after experimenting on dogs, says, "The best method of investigation which is possible is the observation of cases of disease in the human subject in which the exact nature of the lesions is accurately ascertained after death." Again, Professor Charcot points out in his "*Lecons sur les Localisations dans les Maladies Cérébrales*," that "The utmost that can be learned from experiments on the brains of animals is the topography of the ANIMAL brain, and that it must still remain for the science of HUMAN ANATOMY AND CLINICAL INVESTIGATION to enlighten us in regard to the far more complex and highly differentiated nervous organization of our own species; and, in fact, it is from the department of clinical and *post mortem* study that so far all our best data for brain localisation have been secured." Again, "Painstaking and thoughtful observers of cerebral diseases in man were actively and fruitfully at work in this direction more than ten years before the experimenters had sacrificed a single animal to the quest, and it has been repeatedly pointed out by those who are best qualified to judge, that nature continually presents us with ready-made experiments of the most delicate and suggestive kind, impossible for mechanical artifice to realise, on account of the conditions under which artifice must necessarily work."—(See Kingsford in *Science*, a monthly journal, for Feb. 7th, 1884.)

THE ANTISEPTIC TREATMENT OF WOUNDS.

It is true that Sir Joseph Lister (in his evidence before the Royal Commission) stated that he had made experiments on animals in connection with his antiseptic system; but it is not true that such experiments have resulted in benefit to the human race, or that the antiseptic treatment of wounds is in any way due to such experiments. On the contrary, as Mr. Lawson Tait has pointed out, Sir Joseph's experiments with carbolised catgut as a ligature for arteries, while answering admirably in the horse and calf, failed miserably when tried on human beings, and "has cost many lives;" while the treatment of patients with antiseptic dressings was carried out in the wards of the Infirmarys of Edinburgh, Glasgow, and London, upon patients suffering from all kinds of wounds, bruises, and putrefying sores. Such investigations were, without doubt, perfectly legitimate; were on right lines; and to them is due, and not to vivisection, all that we know of the antiseptic system. As to Hunter's treatment of aneurism, this was adopted, as Sir James Paget has pointed out (see Hunterian Oration, 1877), "Not as the result

of any laborious physiological induction (experiments on animals); it was mainly derived from facts very cautiously observed in *the wards and dead-house.*"

Von Graefe assured me himself that he was led to adopt his treatment for glaucoma by noticing that eyes on which he had operated for artificial pupil, became softer in consequence of that operation. He said nothing whatever about experiments on animals, and I do not believe that he made any until he had tested and proved his operations on the patients in his Augen Clinique. Those detailed in the *Times* are so manifestly superfluous, clumsy, and apt to mislead, that I need not say anything more with regard to them.

Galvani's discovery of electricity was due to experiments on dead frogs—"dalle morte rane"—not on living animals; vivisection had nothing whatever to do with it. The anæsthetic properties of ether and chloroform were discovered by experiments upon human patients, not by vivisection of animals. Koch's inoculations with tubercle, which were adopted from experiments upon animals, have led to death from initial fever, the infection of the whole system of patients who merely suffered from localised disease, and to failure and terrible disappointment of patients subjected to it. Vivisection was not needed for the discovery of the properties of nitrite of amyl, nor indeed, so far as I can make out, of anything else; and, after all, "It is not whether such and such a discovery was made by vivisection, but whether vivisection was indispensable to that discovery?" If there are any such discoveries, either made or to be made, I must candidly confess I do not know of them; in fact, if anything could exceed the hideous cruelty of the whole business, it would be the childish absurdity of the claims to benefit which are constantly put forth by the advocates and promoters of the system.

NOTE ON ANTHRAX.—The health and vital powers of the animals subjected to real inoculation are so depressed that they die in very large proportion from various other diseases from which non-inoculated animals are free. This statement is founded upon experiments which were carried out in Buda-Pest and Kapuvar, in the report of which, quoted by Surgeon-general Gordon, I find the following:—"We cannot overlook the fact that after protective inoculation the deaths in which *post mortem* examinations indicated other diseases, such as pneumonia, pericarditis, catarrh, distoma strangulus, and other diseases, occurred exclusively amongst the inoculated animals, and from a practical point of view it is pretty much the same whether the loss be caused by anthrax or other diseases." Professors Koch and Klein and the Hungarian Commission have already unequivocally condemned the system, and Professor Peter, the well-known successor to Trosseau, declares that it is high time to raise a cry of alarm, and take steps to stop a practice which is indefensible in theory and disastrous in results.

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